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PLANNING OF DECENTRALIZED PRODUCTION SYSTEMS

CHAPTER I

PLANNING OF DECENTRALIZED PRODUCTION SYSTEMS

Basic data for planning production systems

Natural resources

1. It is important to have ad some information about the raw material situation in the country in order to determine the possibilities that exist for producing building materials locally. Information on clay, limestone, gypsum, natural pozzolans, mineral ores, gravels, etc., organiz materials - timber and other forest products, as well as industrial and agricultural waste materials, should be known. Informat on on energy resources will also be required. It is not possible to have complete information about the occurrences of these resources, neiteer is it really desirable. Details like the extent of deposit, average thickness of overburden, average thickness of deposits and their yield, and the position of the water table would be necessary when studies aimed at the eventaal extraction of particular raw materials are being undertaking. The available information may therefore be in varying degrees of detail depending on the regular programme of work of the agencies responsible for surveying the deposits and the stage of implementation of decisions regarding the exploitation of specific resources.

2. Geological survey departments have been set up, within the ministries of Mines, Lands or Natural Resources, in many countries. Greater emphasis is however, often placed on the evaluation of mineral ores highly prized on international raw material markets. Very often, therefore, existing geological maps lack information on resources that could be developed for the manufacture of building materials. This situation has to be rectified, where it exists, and specialist teams for the identification, testing, and evaluation of building raw materials should be set up.

3. In countries where geological survey departments do not already exist, steps may have to be taken towards that end, probably on the basis of a project or study initiated with external expert assistance. Mobile units comprising simple drilling equipment and laboratories, appropriately staffed and equipped to carry out the geological search and mapping will be an adequate starting point in some countries. Preliminary information on some raw materials might be obtained from an examination of materials used in traditional construction in various parts of the country, as well as information from local residents about sites where some building materials were produced in the past.

4. Information on timber and other organic materials should normally be available from the offices responsible for forestry and agriculture.

5. Building materials research institutes and testing laboratories, where they do exist, could play useful roles in the detailed evaluation of the suitability of available natural resources for exploitation in building materials production.

Production and consumption of building materials

6. Trends in the production and consumption of different types of building material could be useful as a basis for determining what the future patterns would be. This data is however sometimes difficult to obtain and in several African countries

precise figures are not available. Information on production output in modern industries mass-producing materials like cement, burnt bricks and sanitary ware, as well as other industries registered with the Ministry of Industry may be readily available. However, there are usually large numbers of small industries, some unregistered and scattered in both urban and rural areas, that may be producing a variety of products, and a large statistical service will be required to keep track of their activities, a task which is not easy to undertake. Efforts should however be made to obtain as much information as possible within the limits of the constraints posed by financial and manpower resources. One approach would be to make it compulsory for manufacturers to submit returns on their production output as a condition for the renewal of their licences. Sample surveys conducted by the Ministry of Industry and mail questionnaire surveys have been used with sarying degrees of success.

7. Compilation of data on consumption of various items of building material will be facilitated by the availability, in addition to data on production, of data on imports and exports of the different materials. Statistical data on production, imports and exports are usually collected and published by the national bureau of statistics. It is important that such publications are kept up to date so that their usefulness for planning purposes might not be diminished.

8. The distribution of consumption of materials in different regions or locations of the country should be determined. For materials which are handled by designated distribution organizations it should not be too difficult to obtain the information on the quantities sold in different geographical locations. This type of information would be useful when plans for the development of alternative or substitute materials are being formulated.

9. An estimation of the consumption of building materials in different types of construction would assist in making reliable estimates of the effect on total consumption of changes in the composition of construction output and show the possibilities of interchanging materials.

Future production and consumption

10. The estimation of the future demand for and the production of different items of building materials provides a basis for assessing the future gap between supply and demand and designing strategies to make up for the anticipated shortfall in supply. Estimates of future demand also serve as a guide to the management of existing materials industries in planning the expansion of production lines and the introduction of entirely new lines to meet market demand for materials whose production was hitherto considered uneconomic. Information on past trends is often used as a basis for estimating future production and consumption patterns.

11. In many African countries forecasts of future production in some of the existing plants present problems because of uncertainties about production inputs and the state of repair of production machinery and equipment. This is specially true of capital intensive plants which depend on imported raw materials and spare parts. In such cases the reliance on past trends to forecast future levels without any adjustments would yield erroneous results.

12. Attempts have been made to statistically relate per capita consumption of some materials like cement, steel, sawn timber and wood-based panels to the gross national production and the gross domestic capital formation. The relevance of this kind of analysis as a basis for forecasting in African countries is not certain. This is

because factors like import restrictions, acute shortages and artificially high market prices, etc. have the net effect of suppressing and distorting consumption. There is also the difficulty of determining, for some materials like steel, wood and wood-based products, and plastics, the proportion that is used in construction rather than in other applications.

13. Irrespective of the method of forecasting that is used, it is important to take note of certain factors and changes which could influence the volume and composition of demand for building meterials. These include the following:

(a) Major public construction projects like dams and irrigation schemes generate large but short-term demands for building materials and would necessitate additional imports or severely slow down the pace of other construction projects by creating shortages of materials. Government projects that are in the pipe-line should therefore be carefully scrutinized to determine their probable impact on the building materials market;

(b) The pattern of use of building materials in different types of construction. There could be changes in these patterns as a result of specific policies directed at the promotion of the use of certain materials in place of others whose use in certain types of construction is to be discouraged. It is important to take note of such policies and estimate their effect on future patterns of materials useage. For example it may be government policy to encourage the use of burnt bricks for wall construction in specified types of buildings instead of sandcrete blocks.

14. The major problem associated with the determination of furure production and consumption patterns in many African countries is the lack of a sound statistical data base. This is an area which should receive priority in the planning process for building materials development.

Choice of building materials for local production

15. The materials required in construction may be classified into four main categories by end use: foundations and walls, roofing, fixtures and fittings, and finishes. The historical development of the building materials industry in several countries worldwide has shown an emphasis on the manufacture of walling materials in the early stages of development, followed by the manufacture of roofing and flooring materials and components even if all the essential raw materials were available locally. For example, even the minimum economic plant size for a particular material may be too great for the national demand and unless guaranteed export markets can be found, local production cannot be undertaken.

16. Generally then, the selection of building materials for inclusion in the national building materials development plan would depend primarily on the following factors:

(a) Ready availability of raw materials and other factor inputs. The setting up of plants that would depend heavily on imported raw materials should be given careful scrutiny. Examples abound in African countries of the failure of such plants mainly because of chronic foreign currency constraints;

(b) Size of markets. Information on the local and national demand (and external

demand where export is envisaged) for various building materials and its distribution, as well as the likely future trend should be known. The constraints posed by inadequate transportation networks on distribution should be noted;

(c) Marketability of products. It is clear that if there is an established demand for a specific material, and it is manufactured to acceptable standards, it should not be difficult to market it, assuming that the price is affordable. Cases will however arise where Governments would wish to promote the introduction of new materials into building practice in the country. In such cases, decisions on the production of the materials will have to be coupled with measures aimed at creating markets for the materials, for example, a commitment to use them in planned government-sponsored building programmes;

(d) Climatic and environmental factors. These may warrant decisions on production of specific building materials to meet local needs. For example, in hot dry climatic zones the development of stone and burnt clay products for walling would be desirable from the view point of thermal comform in buildings,

(e) Export potential. The potential for earning foreign exchange through export will be an important criterion specially in the case of materials for which the minimum economic plant size is bigger than the requirements of the national market.

17. With the foregoing considerations in view, a detailed study of the prevailing conditions in each region of the country should be undertaken. The objecti e should be to come up with a list of materials whose production could be considered in a future plan. Within the broad framework provided by the preliminary list of production possibilities, specific decisions could be taken based on accepted investment criteria.

18. Production possibilities for walling materials and binders that should be accorded increasing priority include: burnt clay bricks and blocks, building stone, stabilized soil bricks, gypsum, lime, pozzolana and lime-pozzolana. While a number of countries have plants for the production of portland cement, it should be noted that conventional cement plants (minimum capacity about 2,000 tonnes per day) are far greater than the demand in several countries. The establishment of conventional plants in some countries would therefore not be feasible unless there are guaranteed export markets. There are however prospects for the introduction of mini-cement plants with capacities of upto 200 tonnes per day.

19. The potential for the production of pozzolana has not been exploited in several countries. Pozzolanic materials can be used as partial replacement of portland cement (upto about 40 per cent) without adversely affecting the properties of the resulting cement. They can also be mixed with lime to produce a cementitious binder. Natural pozzolana deposits are found in some countries. Artificial pozzolana could be produced from clays, bauxite waste and rice husk. Ashes from the burning of rice straw, dried banana leaves and bagasse are also reported to have shown good pozzolanic properties.

20. The most popular roof coverings for housing and building construction in urban areas are galvanized corrugated iron, aluminium and asbestos-cement sheets. These materials are essentially imported items and even in countries where they are produced locally, there is still a high foreign exchange cost component. Alternatives that should be investigated are clay roofing tiles, wood shingles and sheets made from cement and natural fibres, like sisal fibre.

Choice of production technology

21. The choice of technology is traditionally based on technical and economic considerations - that is, the chosen technology should be that which is able to produce the required output in the most economical manner. It has already been pointed out that for building materials projects for which there are foreign technical partners, and for which foreign exchange costs are met by loans from external sources, there is usually little flexibility in the choice of technology. This seems to be a major feature of the majority of large-scale capital intensive plants that have been set up in the countries of the African region.

22. The tendency to associate capital intensive technologies with modernity and low-capital, labour-intensive technologies with backwardness or retrogression, should be discarded in favour of a realisitc appraisal of the available technology options in the light of a country's economic and social development goals and the reality of prevailing conditions. Thus, possibilities for promoting building materials production in rural areas, for example, should not be rejected because there are no suitable "modern" technologies for the levels of production envisaged.

23. In the context of African countries, the majority of which face severe balance of payments problems, the minimization of the outflow of scarce foreign-exchange should become an important criterion in technological choice. This criterion, taken in isolation, would generally favour the adoption of labour intensive technologies. For some production processes, for example for sheet glass, suitable labour intensive technologies cannot be identified.

24. A set of criteria for technology choice in implementing the national building materials development plan should therefore be identified. The weight accorded to each criterion in decision-making should reflect the political, social, technical and economic conditions in the country. The primary objective should be to select the most appropriate technology for any given situation. The following suggestion is made on criteria that should be accorded priority:

(a) Technical and economic considerations - efficiency of production, quality of products, and maximization of returns on investment;

(b) Minimization of outflow of foreign exchange - consideration should be given not only to the capital outlay for initial purchase of machinery, equipment and materials from overseas but also to long-term purchases of spare parts, materials and salary transfers for expatriate staff;

(c) Employment generation potential - high levels of unemployment and underemloyment in African countries make this an important consideration;

(d) Sustainability - the extent of availability of local technical and managerial skills, repair and maintenance services that will ensure continuous operation of the plant during the period of its economic life;

(e) Potential for stimulating local development of technology including linkages in the form of fabrication of plant, machines, tools and spare parts.

Assessment of infrastructural facilities

25. The absence of adequate infrastructural facilities such as roads, water and electrical power supply poses serious constraints on the implementation of planned projects for the establishment of industries. The problems are more severe in rural

areas which are usually underserved by such infrastructure in many African countries.

26. In studying the raw material deposits that have great potential for supporting building materials plants, therefore, an appraisal should be undertaken of the extent to which prospective project sites are served by basic infrastructural facilities, of planned programmes for supplying the sites with infrastructure, and the additional requirements for infrastructural facilities which may have to be incorporated into the design of projects for the production of building materials.

27. The office responsible for the preparation of the building materials development plan should liaise closely with the Government ministries, departments and offices that are concerned with the provision of utilities and other infrastructure. Knowledge of the future programmes of these agencies would help in scheduling the programme for the implementation of building materials projects. Agreements could also be reached on the incorporation of the infrastructural needs of building materials projects in special development schemes such as integrated rural development schemes.

Manpower needs

28. Qualified technical and managerial manpower, as well as entrepreneurs with the drive for initiating and pursuing investment activities constitute a critical component in any strategy for achieving a greater measure of local self-sufficiency in building materials supply. In discussing the current situation of the building materials industry in Africa (Chapter I), it was pointed out that the lack of competent technicians and managerial personnel has contributed to the poor performance of plants set up in the past. Dependence on expatriate staff in the early years of plant operation without carefully planned programmes for training nationals to take over after the departure of the former led to operational bottlenecks.

29. In view of this past experience, it becomes necessary, as part of the planning process, to review the current situation regarding manpower in the building materials production sector and to plan for future needs. The following aspects should be covered in the review exercise:

(a) Analysis of the problems concerning different categories of manpower in terms of availability, competence (level of training and experienee) and factors affecting their productivity based on a sample survey of existing production units;

(b) Assessment of training facilities and schemes, if any, operated by the management of existing building materials production units for their personnel;

(c) Assessment of institutional facilities available within the country for training the categories of manpower required by the building materials production sector - technical colleges, polytechnich, vocational training centres, management training institutes, etc. The output of the training institutions, both present and planned, should be noted;

(d) Study of proposed or approved plans for the establishment of training institutions which are likely to generate trained manpower for the building materials industry.

30. In order to be able to plan effectively towards reducing the gap between the supply and demand of manpower for the implementation of building materials projects,

an estimate should be made of the number of personnel of various categories likely to be needed for projects included in the national building materials development plan. The kind of training required to meet the needs of each category should also be defined. In countries where there is an active private sector, it would generally not be easy to forecast the future manpower requirements for that sector since projects generated by it are not subject to co-ordinated planning by a centralized agency. Past experience could however be used as a guide in making estimates for this sector.

31. It would be difficult to plan separately for meeting all the manpower requirements of the building materials industry based on anticipated gaps between supply and demand, given that existing public training institutions normally, cater to the needs of the industrial sector as a whole. In general, therefore, a programme for meeting the future labour needs of the building materials industry would constitute a component in the overall national manpower development plan. This particularly true of categories like welders, electricians and mechanics whose skills can be utilized in industries other than building materials.

32. Special centres could also be set up to train manpower for specific building materials industries like cement, brick and tile, wood and wood-based products, etc.

33. In the small-scale industries sector where there is greater dependence on the skills of the personnel rather than on the equipment used, the quality of persons engaged in management and production is crucial for achieving successful operations. The entrepreneurs, who invariably become the managers of businesses in this sector, very often lack the skills and expertise required to establish and maintain sound production enterprises. One of the important activities of the lead agency responsible for the promotoon of small-scale industries, including those in the building materials industry, should be the design and implementation of suitable training programmes for improving and upgrading the skills of workers and managerial personnel, and for transfering production technologies.

34. The nature of training programmes adopted will depend on specific local needs in various countries. Training methods which have been used in some countries by industrial promotion organizations include the following:

(i) Operation of training centres where clurses where atter the basic training programme trainees are offered the opportunity to be involved in actual production activities relating to their field of interest, for example

(ii) Operation of training cum production centres where after the basic training programme trainees are offered the opportunity to be involved in actual production activities relating to their field of interest, for example brickmaking, lime production, carpentry, etc.

(iii) Organization of seminars and workshops;

(iv) Arranging training, both locally and abroad, in other establishments. Attachment training could be arranged for entrepreneurs in production establishments which utilize the technologies that the entrepreneurs expect to adopt in their own plants;

(v) Undertaking model projects to demonstrate small scale production capabilities.

35. A high percentage of workers in the building materials industry fall within the semi-skilled and unskilled categories. For this group of workers extensive training is usually not required, and on-the-job training is sufficient to enable them to perform their duties. Problems are however very often experienced in finding skilled workmen like carpenters, mechanics, electricians, etc. and also supervisory, technical and managerial staff.

Preparation of building materials development plan

36. The preparation of a plan for the systematic development of the building materials industry is indispensable if progress is to be made towards meeting the requirements of the construction industry for building materials in terms of quantity and quality. The type and extent of detail of plans that could be prepared would be governed by the models on which the whole economy is generally planned. There are however some guidelines which would be applicable to the different planning models that may be adopted, and therefore, should be kept in view:

(a) The goals and targets for the short, medium and long-term periods should be clearly defined. These should be realistic and attainable and should take account of anticipated resource constraints;

(b) Priorities for the development of specific building materials should be determined for each phase of the plan period. Materials which require long gestation periods for the establishment of production units would be programmed for the long-term phase, though in practice preparatory work on the projects could start even during the short-term phase;

(c) The plan should identify project possibilities on the basis of natural resources available in each geographical zone (region, district, etc.) and in conformity with the priorities defined above. Local self-sufficiency in some materials will be an important consideration. For some projects of national importance details may already be available on size of plant, product mix, location and technology. Based on the size of the gap between supply and demand levels, and changes in the patterns of use of materials in different types of construction, estimates can be made of the number of new plants that may require to be established in various geographical zones. In such cases realistic numbers should be determined based on the targets set in (a) above. For example, it can be projected that 10 lime plants and 6 brick plants will be established during the plan period;

(d) While it is relatively easier to be precise with regard to projects to be undertaken by public sector organizations, one cannot be precise about the projects that are likely to be taken up by the private sector. However, if the role of the private sector in the development of building materials industries is clearly spelt out in the government's industrial development policy, targets could be set for that sector and measures taken, during the plan implementation period, to attract the participation of the private investor;

(e) The modalities for achieving higher capacity utilization rates in existing building materials plants should be clearly spelt out. Rehabilitation and upgrading programmes with the objective of increasing installed capacities should also be indicated;

(f) The implications of planned projects in terms of cost, technology, energy, infrastructural facilities, trained manpower, etc. should be determined and the modalities for overcoming the consequences of these implications should be outlined. This matter is discussed further in Chapter V;

(g) The plan should help to promote the deventralization and diversification of materials production to ensure the timely availability of building materials for construction projects in all geographical zones of the country;

(h) The plan should be amenable to periodic review based on the monitoring of its implementation.

Machinery for the co-ordinated planning and development of the building materials industry

37. Several ministries and institutions in the public sector undertake activities that concern the development of the building materials industry. The Ministry of Industry is the government ministry with primary responsibility for defining policies and setting out general guidelines for the establishment of building materials plants. However, other ministries like Works, Housing, Natural Resources, Forestry, Rural Development, Planning, etc. exercise functions relating to the production and use of building materials. There is need in several African countries for a central machinery that would ensure a comprehensive and co-ordinated approach to the planning and implementation of programmes for the development of the industry.

38. Three options could be examined with regard to the creation of such a machinery:

(a) Establishing an inter-ministerial/agency/institution co-ordinating committee with membership from concerned bodies;

(b) Entrusting responsibllity for the co-ordinating functions to an existing competent institution;

(c) Establishing an independent Building Materials Development Secretariat under a concerned ministry or office.

39. The functions of the co-ordinating machinery could include the following:

(a) Generally advise the Covernment on measures and policies for promoting the bullding materials industry taking account of the need for decentralization and diversification of production, the choice of appropriate production technologies, mobilization of finance, etc.;

(b) Facilitate and encourage collaboration among government agencies, parastatals and other bodies concerned with the building materials industry in order to promote the setting up of production units and the rational use of materials in construction;

(c) Advise the government on appropriate policies and measures for promoting rationalization of building material useage including the adoption of proven materials and techniques developed from local resources;

(d) Compile, analyse and publish statistical, technical and other information such as may be required for preparing plans or formulating policies regarding the industry,

(e) Facilitate or co-ordinate assistance to entrepreneurs wishing to set up building materials plants;

(f) Promote the carrying out of research and the "commercialization" of research findings;

(g) Promote information, standardization and regulatory activities for enhancing the use of materials in construction.

CHAPTER II

IMPLEMENTATION OF PROGRAMMES AND PROJECTS FOR THE ESTABLISHMENT OF BUILDING MATERIALS PRODUCTION UNITS

Basic requirements

42. The implementation phase of programme and project development is as equally important as the planning phase and its requirements should be carefully anticipated, and incorporated into the plans prepared in order to ensure the achievement of the anticipated results. Failure at the implementation stage could well be a reflection on failure to produce a realistic and attainable plan. It is also true that the best plans would olly remain ideas on paper unless concrete steps are taken to provide the required resources and environment to ensure that they result in operational projects.

43. A review of the rate of achievement of national development plans in several African countries would show a sizeable gap between the anticipated targets in various economic sectors and the actual results achieved. A number of factors could be cited as having contributed to this state of affairs: setting of overly-ambitious targets without reference to available resources; failure to mobilize adequate financial assistance and other incentives to projects in some sectors; absence or inadequacy of infrastructural services like technical consultancy, research and development, training and extension services; lack of technical assistance and information services; poor co-ordination and monitoring mechanisms.

44. The following and other related questions should therefore be asked and adequately answered if programmes and projects planned in connexion with the search for a viable building materials industry capable of meeting the requirements of various kinds of building materials in different locations across the country.

(a) Are the targets set out in the building materials development plan realistic and attainable, having been based on a careful appraisal of available resources?

(b) How are funds to be mobilized from both public and private sources to ensure the smooth implementation of projects for the setting up of production units? Are there any incentives that could be devised to induce entrepreneurs to invest in building materials projects included in the plan?

(c) Are there adequately developed technical back-stopping services to assist public enterprizes and private entrepreneurs? For example, if an entrepreneur decides to set up a small scale plant for the production of burnt bricks, are there offices he could contact for assistance, and advise on such matters as size of production unit, suitable production technology, sources of supply of machines or tools, sources of finance and process of acquiring funds from such sources, etc., etc

45. These topics form the subject of discussion in the remaining part of this chapter.

Institutional support

46. The successful implementation of the national building materials development plan is dependent on the existence of competent institutional machineries for monitoring the rate of implementation of different phases of the plan, evaluating constraints to plan implementation and devising remedial measures, providing guidance and assistance

on administrative and legal procedures for investments in industrial projects, providing technical and financial assistance to investors in building materials projects. The experience of several African countries indicates that these functions are normally carried out not only by one institution, but by a number of institutions including government ministries, investment development and promotion centres, and industrial development banks.

45. Irrespective of the mix of institutions set up to assist investors in building materials projects in the manner described above, steps must be taken to ensure that the following aspects are covered sufficiently:

(a) Provision of technical assistance and guidance with respect to: preparation of project studies and feasibility reports; guidance on sources of production technology and selection of plant size and suitable technologies including machinery, plant and equipment;

(b) Assisting entrepreneurs to secure the services of other organizations for resolving some of the problems relating to the setting up of a building materials production unit, such as evaluation of raw material reserves to determine their quantity and suitability for production process;

(c) Facilitating access to funding sources and funds both local and foreign, and granting incentives that would help to attract investments in building materials projects.

(d) According priority to the monitoring of the implementation of projects in the building materials sector as a continuing exercise. This would help to identify bottlenecks emanating, for example, from lack of production inputs, suitable technologies and related equipment, finance, skills, etc. The importance of programme and project monitoring cannot be overemphasized.

46. The special needs of small-scale building materials industries in respect of institutional support are discussed separately below. The role of other institutions necessary for the successful implementation of programmes aimed at the decentralized production of building materials such as research, information and training institutions is also discussed later in this chapter.

Small-scale industries development organizations

47. The problems of entrepreneurs in the small-scale industrial sector need to be accorded special attention. Most of the existing industrial promotion organizations concentrate their activities on medium and large scale projects. However, as has already been pointed out some countries in Africa have set up industrial development organizations to deal with the special pooblems of small-scale industries. Existing organizations in the small-scale sector would have to strengthen their activities relating to building materials industries. In countries where such organizations do not already exist, the governments should investigate the feasibility of enlarging the mandate of existing industrial development or promotion organizations to cover small-scale building materials industries or else consider the creation of suitable organizations for that purpose.

48. The functions of organizations for promoting small-scale industries (including building materials industries) should include the following:

(a) To plan and coordinate the activities on small-scale industries and undertake such measures as would promote their orderly and balanced development;

(b) To provide technical assistance to small-scale industries including: identification of products to be manufactured, preparation of project reports and feasibility studies, selection of production technology and related machines and equipment, project implementation;

(c) To provide extension services on management, technical problems, marketing and accounting;

(d) To provide or assist in mobilizing financial resources for the establishment of industries in the small-scale sector;

(e) To undertake or promote research geared to the development of small-scale industries including technology development, standardization and quality control, management techniques, marketing strategies, etc.

(f) To provide and promote training facilities and programmes for entrepreneurs or employees of small-scale industries and to assist and co-ordinate the activities of other institutions engaged in such training.

Incentives for building materials production

Direct incentives

49. The building materials industry, as part of the general manufacturing sector, benefits from various promotion measures instituted by governments as part of the strategy to encourage and attract investments into industrial development projects. These measures, which unintentionally favour the establishment of large-scale and capital intensive firms include:

(a) Tax holiday for specified time periods (usually 5 to 10 years);
(b) Investment allowances or subsidies;
(c) Capital allowances over and above normal depreciation allowances;
(d) Reinvestment allowance;
(e) Exemption from customs and excise duties on equipment, machinery and raw materials;
(f) Guarantees on repatriation of capital and profits.

50. The nature of investments in building materials projects is such that short-term returns tend to be generally lower than can be obtained from other sectors, and thus may not be attractive to entrepreneurs. Erratic market fluctuations also increase the risk factor in such investments. In addition to the incentives listed above, governments should consider other measures which would help to create a more favourable investment climate for the establishment of new building materials plants and the expansion of existing ones.

51. These measures could include the following:

(a) Granting long-term low interest loans and facilitating access to such loans;

(b) Assisting public manufacturing enterprises through subsidies and grants;

(c) Providing land at concessionary rates, and supplementary basic infrastructure including access roads to production sites. Development of industrial estates should be explored;

(d) Providing guarantees for import of basic machinery and equipment specially by private-sector investors;

(e) Protecting plants producing items of building materials against unfavourable competition from imported substitute materials through import restrictions and taxes on imported materials.

Indirect incentives

52. Some of the materials to be promoted within the framework of a decentralized production system utilizing locally available raw materials would be relatively unknown on the building materials market. The increased production and use of such materials will therefore depend greatly on the breaking down of psychological barriers founded on conservatism and sometimes unrelated directly to their technical performance characteristics. The formulation and enforcement of quality standards and testing controls for such materials, and the government's commitment to use them in government-sponsored projects would contribute greatly in enhancing their increased use in both public and private housing and building projects, thereby ensuring an improved market for the output of production units that would be set up.

53 The use of demonstration housing projects to establish the credibility and technical viability of less-used building materials has been a very popular concept. Experience has however shown that several demonstration projects have failed to make the expected impact primarily because of the approaches used and the absence of follow-up in the use of such materials in public housing and building projects. The idea of promoting some materials for use by the "poor" has very often generated negative impressions about their suitability for decent and durable building construction. It has already been stressed that governments have a vital role to play in creating markets for 'new' building materials. Practical examples of the use of materials in government housing projects, for instance, can help greatly to remove common prejudices about such materials. The confidence of public construction agencies, as well as contractors and builders, in new building materials will be enhanced by the existence of building legislation such as building codes, standards and regulations which give due recognition to the application of such materials in building practice. Governments have to give high priority to the reformulation of existing building legislations, which, in most African countries, act as hindrances to the increased production and use of some building materials and components.

54. Other measures that could help to stimulate investments in building materials production units include the development of building research centres and materials testing laboratories, the promotion of standardization and quality control activities, and the creation of an adequate base of information, trainnng and extension services.

Financing of building materials projects

55. Adequate financial support is crucial for the realization of plans to improve the supply of building materials through local production. A number of building materials production units exist in African countries which were set up as joint ventures, with

the foreign exchange component of investment costs financed by foreign partners while the local cost component was financed by the national governments and/or private entrepreneurs. Such plants have been almost always in the large-scale capital intensive category. While this mode of financing has contributed greatly to the realization of vital materials projects, it may also have contributed to the operational problems experienced by some of the plants that have been constructed. The technology component and the related machinery and equipment are usually the products of companies of the foreign technical partner and this places a constraint on the choice that can be made. The existence of competent national consultancy services capable of evaluating project investment proposals could, however, help in minimizing the technical operational problems that could arise in connection with this type of joint venture.

56. Many countries would still find it advantageous to encourage foreign participation in the establishment of building materials plants. The nature and scope, as well as the measures instituted to attract such participation should be clearly defined and publicized. The assistance of international financial institutions and bilaterla funding agencies should be sought for the implementation of high cost projects for strategic materials such as cement, iron and steel products, and glass. Participation in joint ventures with neighbouring countries for the production of materials for which national markets are inadequate to sustain the minimum economic size of production should be encouraged in the cases where economic, financial and technical feasibility can be established.

57. Experience in some countries has shown that assistance could be mobilized for small-scale industries through international co-operation arrangements with developed and developing countries in other regions. In this way funds, machinery, equipment and technical expertise could be secured in support of programmes and projects for the establishment of small-scale plants.

Mobilization of funds from local sources

58. It is not always easy to find foreign collaboration for building materials projects and long gestation periods result in escalation of project investment costs. This situation calls for the effective mobilization and use of financial resources available locally to meet the needs of building materials industries.

59. The traditional sources of funds for building materials projects are the development finance institutions like industrial development banks, national investment banks and specialized housing finance banks. Investments in building materials projects are however not very attractive, particularly from the point of view of the private investor because of lower returns and relatively long cost repayment periods, high initial capital outlay (for capital intensive projects) and demand uncertainties resulting from fluctuations in construction output. The need therefore arises to examine the possibility for the granting of long-term loans at interest rates lower than the on-going convercial rates.

60. In some countries where the governments have accorded high priority to the development of small industries, some banks have been authorized to set up special departments to deal with the granting of credit facilities to the small scale industries sector. The lending policies of such departments should be tailored to the specific needs of this sector in order to achieve significant operational results. In order to boost the operations of such banks or financing institutions in the area of small scale building materials industries, governments may have to place, from time to time, special funds or grants at their disposal. Such financial allocations should reflect the government's

recognition of the importance of the building materials sector to the sound development of the national economy.

61. In view of the general scarcity of financial resources at the national level to satisfactorily meet the needs of competing demands in various sectors of the economy, it becomes necessary to re-examine the question of mobilization of funds from the private sector in support of building materials projects especially in the market-economy countries. The private investor generally goes for investment opportunities with potentially attractive returns and low risk factors. Investments in building materials industries, which in general do not appear attractive, therefore have to be rendered attractive enough to elicit the attention of the private investor. Governments have used both direct and indirect fiscal and other measures as discussed above to achiev this objective.

62. Questions relating to the provision of basic infrastructure, the reduction of uncertainties in demand levels and patterns, and the existence of adequate technical back-stopping services aee all important from the point of view of the private investor.

Research and development activities

63. The encouragement of decentralized systems of building materials production based on the rational utilization of potentially useable raw materials in scattered locations would inevitably lead to the promotion of materials that are new to the local building industry, even though some of such materials may have had a long tradition of use in other countries. Building materials like lime, lime-pozzolana and stabilized soil fall into this category. There are other materials like rice husk ash cement, and some types of fibre reinforced panels and sheets which are relatively recent and on which studies are still in progress particularly with regard to long-term performance characteristics and specific areas of application. There also exists the danger of uneconomic use of established materials like cement and concrete in construction projects because of imported design concepts that do not sufficiently reflect local climatic conditions.

64. It is therefore important bo build up local research capabilities to assist in developing the technical base for the manufacture and use of building materials derived from local resources. The functions of a national building/building materials research institution in this respect should include the following:

(a) Undertake studies and provide information about properties and performance characteristics of locally produced building materials to assist in formulation of standards and preparation of design guidelines;

(b) Develop production technologies appropriate to local resource conditions; emphasis should be on technologies that can be applied in small- and medium-scale production ventures;

(c) Provide testing facilities and technical advisory and consultancy services to prospective investors in building materials projects;

(d) Develop design concepts for the efficient and economic use of building materials in building and constructinn in the various climatic zones of the country; special attention should be devoted to materials which are new to the construction market;

(e) Engage in the design of simple plant, equipment and tools that could be commercialized for use in building materials production units;

(f) Generally promote the production and use of building materials derived from local resources through demonstration projects, dissemination of technical information in simplified formats, organization of training courses on building materials production and utilization techniques and provision of advice to builders and designers on choice of materials and techniques.

65. The programme of work of institutions engaged in research on building materials should be aimed primarily at meeting urgent and practical needs. In this connexion, the programme of work should be based on the national plan for the development of the building materials industry with a view to providing technical support for the achievement of the targets in the plan. Other areas of action with respect to research and development activities are as follows:

(a) In some of the African countries where building and building materials research institutes exist, their activities have not always been accorded the priority they deserve. Insufficient financial resources, lack of modern equipment and lack of qualified acientists and technologists have all contributed to reducing their capacity for making a meaningful impact on activities in the building industry. Efforts are needed at the national level to overcome these constraints. The feasibility of setting up a research fund with contributions from the public and private building and construction sector should be studies;

(b) The active involvement of manufacturers, financiers and other user organizations in research planning and programming should be encouraged as a means of mobilizing resources for research and enhancnng the wider application of research findings;

(c) Governments should also iive attemtion to the promotion of joint research programmes with other countries having similar raw material resources, climatic conditions and building and building materials development problems.

66. The sharing of experiences through information exchange should be encouraged to avoid duplication of research effort. For some countries it may be desirable to consider the pooling together of resources for the creation of joint building and building materials research centres. In this way the limited financial and other resources available nationally could be mobilized to undertake the kind of research activities that would make an impact on the development of the local building industry.

Information, training and extension services

67. These three services constitute an important link in the process of technology transfer in the field of building materials industries development. The conventional large scale plants usually involve the application of imported technologies for which personnel are trained both overseas and locally on the job. Experience has however shown that in several cases the technology assimilation has been incomplete by the time of the handing ov r of the plant to the local counterpart team and operational and

management problems have resulted. This raises the question of matching technology choice with the level of local technical expertise and its ability to absorb a given technology over a given time period. Governments must ensure the incorporation of suitably designed and realisitc training components in such project proposals to avoid the wastage of scarce financial resources in projects that would otherwise be unprofitable.

68. The problem of greater concern in this section relates to the provision of the kind of information, training and extension services that would help in the widespread application of technologies for medium and small-scale building materials production throughout the country. It is expected that much of this technology range would have been developed by natinnal research and development nnstitutions or adapted from foreign-developed technologies by such institutions or industrial development organizations, and tested in demonstration projects in the country.

69. Various reasons can be enumerated for the non-adoption of technologies for building materials, as well as, techniques of building construction employing some materials produced from local resources, developed by local research and development institutions. Among them are the following:

(a) Failure of Research and Development(R & D) institutions to adopt an aggresive attitude in marketing their research findings and convincing the public and private sector of the technical and commercial viability of new processes and techniques;

(b) Failure to present research findings in simple technical language and in a form that can be easily understood by the user public;

(c) Absence of regional centres where information and advice on, as well as training in, production and building techniques can be obtained;

(d) Lack of proper guidance on potential investment opportunities and technical assistance to prospective investors.

70. In their programmes to achieve effective decentralized systems of materials production based on suitable technologies, governments would have to assist in removing existing bottlenecks to building materials technology transfer. Solutions could include the following:

(a) Strengthening the capacities of R & D institutions to set up demonstration plants to demonstrate the feasibility of new production technologies and offer training to entrepreneurs;

(b) Encouraging and assisting Research and Development institutions to expand their information and documentation activities, to produce simplified technical literature translated, if possible, into selected local languages, and also to produce audio-visual materials, all for the purpose of facilitating dissemination of relevant information to various target groups;

(c) Setting up building/building materials information centres in accessible locations on regional/district basis where prospective entrepreneurs can botain simplified technical literature on production methods, see samples of materials that can be produced by using the technologies being promoted and also request advice on the modalities of setting up a production unit. Such centres could be set up as extension

wings of R & D institutions or industrial development organizations but in some countries it may be thought expedient to set up the centres as separate organizations within a concerned government ministry. Irespective of the type of organizational structure adopted, there should be close collaboration among the R & D institutions, the industrial development organizations dealing with building materials development and the building/building materials information centre.

(d) Organizing extension programmes whereby entrepreneurs would be given practical assistance in the setting up of production units covering such aspects as: design of plant lay-out and production system, installation of machines, training of workers in production process, organization of accounting and management procedures, etc. This function could be carried out by the industrial development organization in collaboration with the concerned research and development institution.

71. The ultimate objective of all the measures discussed above should be to facilitate a prospective entrepreneur's access to the information that the needs to make a sound decision on an investment in a building materials plant and to provide the assistance he needs to set up and operate a plant which will bring him a reasonable return on his investment. One positive effect of the success of entrepreneurs in this way would be the saving of foreign exchange which could be used to meet the import needs of other sectors of the national economy.

Local fabrication of machines, equipment and tools

72. The successful development of a viable and self-reliant building materials industry based on a mix of small-, medium-, and large-scale production units depends on, among other factors, the creation of local capacities for the fabrication of simple machines, equipment and tools required for the setting up and operation of the production units. This is particularly crucial for the promotion of the widespread adoption of locally developed (or adapted) production technologies. The fabrication of spare parts to satisfy the needs of existing plants, specially those based on imported technology for which, because of foreign exchange constraints, spare parts cannot be imported regularly to undertake maintenance and repair operations, would help to boost production in some of the plants.

73. There exist already in some countries facilities, with varying degrees of capability, for the manufacture of machines, equipment and tools for the agricultural sector and also for some sectors of industry. Some of these capacities have developed as an off shoot of the activities of engineering workshops of training institutions (technical schools and colleges, vocational training centres, etc.), service and manufacturing companies (Railway authorities, Mining and Steel Companies, etc.). In some cases companies have been set up for the express purpose of fabricating much needed machines and equipment particularly for the agricultural sector. In addition there are mechanical workshops in the informal sector where items of equipment and tools can be fabricated in accordance with specifications supplied by a client. Problems of poor quality products are however common with such workshops.

74. Governments need to evaluate the potential that already exist at the national level and evolve long-term strategies for strengthening the country's facilities and capabilities with regard to the fabrication of machines and equipment for the building materials industry. The actions that are required, in this connexion include the following:

(a) Undertaking an assessemnt of the capabilities of engineering and metal work-

shops, both in the formal and informal sectors, in relation to the fabrication of various items of machines, equipment and tools. The assessment should cover both the items that are currently produced and those that could be produced if a demand was established;

(b) Preparing a long-term plan for the development of facilities and expertise for machine and equipment manufacturing industry including the setting up of machine shops, foundries, forging and heat treatment shops. The development of skilled manpower and provision of specialized machinery, equipment and other inputs should be stressed in the plan;

(c) Designing a programme for upgrading and strengthening the existing facilities at selected workshops in technical colleges and public enterprises to improve their capacities for fabricating machines and equipment, particularly for the building materials industry. This approach may be adopted as the first step in the process for setting up full-fledged machine and equipment manufacturing centres;

(d) Preparing a programme of assistance to engineering workshops in the informal sector which have great potential for contributing to the achievement of the targets of the long-term plan (see (b) above). This programme should take account of the possibility of grouping some of the workshops into co-operatives as a means of enhancing their efficient operations. The provision of loans under favourable terms and assistance in securing specialized production machinery and equipment would be essential for the success of this programme;

(e) Seeking assistance from bilateral funding sources in the form of machinery, equipment, funds and expertise for the implementation of the long-term plan referred to in (b) above;

(f) Encouraging investments by the private sector in facilities for fabricating machines, equipment and tools by granting suitable incentives.

CHAPTER III

GENERAL POLICY MEASURES

75. The foregoing discussion has drawn attention to the important role that national governments are called upon to play in providing a sound base and the conditions favourable to the organized and coordinated development of the building materials industry, keeping in view the need to utilize all potential resources within the framework of a decentralized production system. Reference has been made, in several sections of the document, to some of the policy measures that need to be taken by governments in that connexion. This chapter provides a summary of some of the main policy measures.

76. The need to achieve an increasing measure of self-sufficiency in the building materials industry is generally recognized by the Governments of the countries in the African region. This recognition should be backed by a renewed political commitment which should be translated into concrete measures that would promote the development of the industry. The following measures should be stressed:

(a) Giving due recognition to the importance of the building materials industry in the national economy and ensuring that its needs are explicitly catered for in national short-term and long-term development plans;

(b) Creating or strengthening an existing machinery for coordinating all aspects of the building materials industry, assisting in the preparation of a building materials development plan and monitoring its implementation;

(c) Ensuring a balanced development of building materials industries in all parts of the country usnng a mix of large-, medium-, and small-scale production units employing technologies that are appropriate to local economic, social and technical conditions;

(d) Encouraging the establishment of small-scale building materials industries and setting up suitable institutions to promote their growth in both urban and rural areas;

(e) Creating or strengthening local institutions and facilities for designing and fabricating machines, equipment and spare parts required for locally developed technologies and also to maintain the operatoon of plants based on imported technologies;

(f) Promoting research and development activities in the field of building materials and building techniques and ensuring the extensive adoption of research findings in practical projects;

(g) Encouraging standardization, quality control and building legislation activities that promote diversification in the range of materials available for construction. This should include formulating suitable standards for local building materials, setting up efficient testing laboratories and reformulating existing building codes and regulations to include specifications and guidelines for the use of local building materials;

(h) Giving special attention to the development of manpower of all categories, including entrepreneurs, for the building materials industry and setting up appropriate to aiming facilities and programmes;

(i) Mobilizing financial resources, both local and foreign, to support projects in the building materials industry;

(j) Encouraging the participation of the private sector in the development of the industry by providing suitable incentives including facilitation of access to credit and provision of land and infrastructure at concessionary rates;

(k) Promoting the widespread use of newly developed materials and building techniques by supporting demonstration projects and also ensuring their utilization in projects sponsored by the government in both urban and rural areas.

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